

## WHAT IS CLAIMED IS:

1. A decoding method of decoding encoded image data which has been hierarchically encoded  
5 in advance, comprising:

determining a size of an image to be outputted; and

decoding the encoded image data up to a layer of hierarchy which is at least one layer  
10 more than a minimum number of layer/layers of hierarchy necessary to acquire an image of the determined size.

2. The decoding method according to claim  
15 1, wherein said decoding includes:

determining the minimum number of layer/layers of hierarchy necessary to acquire the image of the determined size; and

decoding the encoded image data up to a  
20 layer of hierarchy which is at least one layer more than the determined minimum number of layer/layers of hierarchy.

3. The decoding method according to claim  
25 1, wherein said decoding includes:

determining a layer/layers of hierarchy each of which, when the encoded image data is decoded

up to each layer, makes a size of a decoded image exceed the determined size; and

decoding the encoded image data up to a layer of hierarchy which is at least one layer more than the lowest of the determined layer/layers.

4. The decoding method according to claim 1, wherein said decoding includes:

- 10 decoding a lowest layer of hierarchy of encoded image data among layer/layers which has/have not been decoded, comparing a size of an image obtained by decoding the encoded image data and the determined size, and repeating the
- 15 decoding of a lowest layer of hierarchy of the encoded image data among the layer/layers which has/have not been decoded when the size of the decoded image is smaller than the determined size; and
- 20 decoding a next lowest layer of hierarchy of the encoded image data.

5. The decoding method according to claim 1, wherein said decoding includes:

- 25 acquiring a layer of hierarchy which is at least one layer more than a minimum number of layer/layers of hierarchy necessary to obtain a

decoded image of the determined size using a look up table on the basis of a size of an image to be obtained by decoding all of the encoded image data and the determined image size; and

5            decoding the encoded image data up to the acquired layer of hierarchy.

6.        The decoding method according to claim 1, further comprising reducing the size of the  
10    decoded image to the determined size.

7.        The decoding method according to claim 1, further comprising determining whether the minimum number of layer/layers of hierarchy  
15    corresponds to all the layers of hierarchy of the encoded image data,

          wherein if the determination proves true, all the layers of hierarchy of the encoded image data are decoded.

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8.        The decoding method according to claim 1, wherein the determined size includes horizontal pixel number information and vertical pixel number information.

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9.        The decoding method according to claim 1, wherein an encoding method used is a discrete

wavelet transform method.

10. The decoding method according to claim  
1, wherein an encoding method used conforms to  
5 JPEG2000.

11. A decoding apparatus for decoding  
encoded image data which has been hierarchically  
encoded in advance, comprising:  
10 a determination unit that determines a size  
of an image to be outputted; and  
a decoding unit that decodes the encoded  
image data up to a layer of hierarchy which is at  
least one layer more than a minimum number of  
15 layer/layers of hierarchy necessary to acquire an  
image of the determined size.

12. A storage medium, readable by an  
information processing apparatus, storing a  
20 program including program codes capable of  
realizing the decoding method according to claim 1,  
the program being executable by the information  
processing apparatus.

25 13. An encoding method of hierarchically  
encoding an image, comprising:  
determining a size of an image to be

outputted; and

encoding the image up to a layer of  
hierarchy which is at least one layer more than a  
minimum number of layer/layers of hierarchy  
5 necessary to acquire an image of the determined  
size.

14. The encoding method according to claim  
13, wherein said encoding includes:

10 determining the minimum number of  
layer/layers of hierarchy necessary to acquire an  
image of the determined size; and

encoding the image up to a layer of  
hierarchy which is at least one layer more than  
15 the determined minimum number of layer/layers of  
hierarchy.

15. The encoding method according to claim  
13, wherein said encoding includes:

20 determining a layer/layers of hierarchy each  
of which, when the image is encoded up to each  
layer, makes a size of an encoded image exceed the  
determined size; and

encoding the image up to a layer of  
25 hierarchy which is at least one layer more than  
the lowest of the determined layer/layers.

16. The encoding method according to claim 13, wherein said encoding includes:

encoding a lowest layer of hierarchy of an image among layer/layers which has/have not been encoded, comparing a size of an encoded image and the determined size, and repeating encoding of a lowest layer of hierarchy of the image among the layer/layers which has/have not decoded when the size of the encoded image is smaller than the determined size; and

encoding a next lowest layer of hierarchy of the image.

17. The encoding method according to claim 13, wherein said encoding includes:

acquiring a layer of hierarchy which is at least one layer more than a minimum number of layer/layers of hierarchy necessary to obtain an encoded image of the determined size using a look up table on the basis of a size of the image and the determined image size; and

encoding the image up to the acquired layer of hierarchy.

18. The encoding method according to claim 13, further comprising determining whether the minimum number of layer/layers of hierarchy

corresponds to all the layers of hierarchy to which the image data can be encoded,

wherein if the determination proves true, the image are encoded up to the possible layer.

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19. The encoding method according to claim 13, wherein the determined size includes horizontal pixel number information and vertical pixel number information.

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20. The encoding method according to claim 13, wherein an encoding method is a discrete wavelet transform method.

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21. The encoding method according to claim 13, wherein an encoding method conforms to JPEG2000.

22. An encoding apparatus for  
20 hierarchically encoding an image, comprising:  
a determination unit that determines a size of an image to be outputted; and  
an encoding unit that encodes the image up to a layer of hierarchy which is at least one  
25 layer more than a minimum number of layer/layers of hierarchy necessary to acquire an image of the determined size.

23. A storage medium, readable by an information processing apparatus, storing a program including program codes capable of realizing the encoding method according to claim 13, the program being executable by the information processing apparatus.

24. An encoding method of hierarchically encoding an image, comprising:

restraining a frequency component which causes alias of an image signal of the image at the time of separating the image signal into layers of hierarchy; and

separating the restrained image signal into layers of hierarchy.

25. The encoding method according to claim 24, wherein said restraining includes:

restraining a high frequency component of the input image signal; and

restraining a low frequency component of the input image signal.

26. The encoding method according to claim 25, wherein a low pass filter is used in said restraining of the high frequency component, and



an output from said low pass filter is subtracted from the input image signal in said restraining of the low frequency component.

5           27.    The encoding method according to claim 25, wherein a high pass filter is used in said restraining of the low frequency component, and an output from the high pass filter is subtracted from the input image signal in said restraining of  
10 the high frequency component.

          28.    The encoding method according to claim 25, wherein a low pass filter is used in said restraining of the high frequency component, and a  
15 high pass filter is used in said restraining of the low frequency component.

          29.    The encoding method according to claim 25, repeating said restraining and said separating  
20 for an image signal obtained by separating the image signal whose high frequency component is restrained.

          30.    The encoding method according to claim 25  
25 26, wherein a filter is used in said separating, and a passband of the low pass filter is narrower than a passband of the filter used in said

separating.

31. The encoding method according to claim  
28, wherein a filter is used in said separating,  
5 and a passband of the low pass filter is narrower  
than a passband of the filter used in said  
separating.

32. The encoding method according to claim  
10 27, wherein a filter is used in said separating,  
and a passband of the high pass filter is narrower  
than a passband of the filter used in said  
separating.

15 33. The encoding method according to claim  
28, wherein a filter is used in said separating,  
and a passband of the high pass filter is narrower  
than a passband of the filter used in said  
separating.

20

34. The encoding method according to claim  
25, wherein in said restraining of a high  
frequency component and a low frequency component,  
at least either one of a horizontal component and  
25 a vertical component of the image signal is  
restrained.

35. The encoding method according to claim 24, wherein an encoding method is a discrete wavelet transform method.

5 36. The encoding method according to claim 24, wherein an encoding method uses an orthogonal mirror filter at least.

37. The encoding method according to claim 10 24, wherein an encoding method conforms to JPEG2000.

38. An encoding apparatus for hierarchically encoding an image, comprising:

15 a frequency restraining unit that restrains a frequency component which causes alias of an image signal of the image at the time of separating the image signal into layers of hierarchy; and

20 a separating unit that separates the image signal restrained by said frequency restraining unit into layers of hierarchy.

39. The encoding apparatus according to 25 claim 38, wherein said frequency restraining unit comprises:

a first restraining unit which restrains a

high frequency component of the input image  
signal; and

a second restraining unit that restrains a  
low frequency component of the input image signal.

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40. The encoding apparatus according to  
claim 39, wherein said first restraining unit is a  
low pass filter, and said second restraining unit  
is a subtractor which subtracts the image signal  
10 restrained by said first restraining unit from the  
input image signal.

41. The encoding apparatus according to  
claim 39, wherein said second restraining unit is  
15 a high pass filter, and said first restraining  
unit is a subtractor which subtracts the image  
signal restrained by said second restraining unit  
from the input image signal.

20 42. The encoding apparatus according to  
claim 39, wherein said first restraining unit is a  
low pass filter, and said second restraining unit  
is a high pass filter.

25 43. The encoding apparatus according to  
claim 39, wherein said frequency restraining unit  
and said separating unit recursively perform

processes on an image signal obtained by  
separating by said separating unit the image  
signal restrained by said first restraining unit.

5           44.     The encoding apparatus according to  
claim 40, wherein said separating unit includes a  
filter, and a passband of the low pass filter is  
narrower than the passband of the filter of the  
separating unit.

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          45.     The encoding apparatus according to  
claim 42, wherein said separating unit includes a  
filter, and a passband of the low pass filter is  
narrower than the passband of the filter of the  
15 separating unit.

          46.     The encoding apparatus according to  
claim 41, wherein said separating unit includes a  
filter, and a passband of the high pass filter is  
20 narrower than the passband of the filter of the  
separating unit.

          47.     The encoding apparatus according to  
claim 41, wherein said separating unit includes a  
25 filter, and a passband of the high pass filter is  
narrower than the passband of the filter of the  
separating unit.

48. The encoding method according to claim  
39, wherein said first and second restraining unit  
restrain at least either one of a horizontal  
5 component and a vertical component of the image.

49. The encoding apparatus according claim  
38, wherein an encoding method is a discrete  
wavelet transform method.

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50. The encoding apparatus according to  
claim 38, wherein an encoding method uses an  
orthogonal mirror filter at least.

15 51. The encoding apparatus according to  
claim 38, wherein an encoding method conforms to  
JPEG2000.

20 52. A storage medium, readable by an  
information processing apparatus, storing a  
program including program codes capable of  
realizing the encoding method according to claim  
24, the program being executable by the  
information processing apparatus.

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53. A decoding method of decoding encoded  
image data which has been hierarchically encoded

in advance, comprising:

determining a layer of hierarchy up to which  
the encoded image data is to be decoded;

decoding the encoded image data up to the  
5 determined layer;

judging whether or not the determined layer  
corresponds to the highest layer of hierarchy of  
the encoded image data; and

restraining, when the determined layer does  
10 not correspond to the highest layer, a frequency  
component, which causes alias, of the decoded  
image data.

54. A decoding method of decoding encoded  
15 image data which has been hierarchically encoded  
in advance, comprising:

decoding all of the encoded image data;

judging whether or not the encoded image  
data was obtained as a result of encoding all  
20 layers of hierarchy; and

restraining, when all the layers of  
hierarchy have not been encoded, a frequency  
component, which causes alias, of the decoded  
image data.

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55. A decoding method of decoding encoded  
image data which has been hierarchically encoded

in advance, comprising:

inputting encoded image data from external;  
determining a layer of hierarchy up to which  
the encoded image data is to be decoded;

5        decoding the encoded image data up to the  
determined layer;

judging whether or not all layers of  
hierarchy of the encoded image data have been  
decoded; and

10        restraining, when all the layers of  
hierarchy have not been decoded, a frequency  
component, which causes alias, of the decoded  
image data.

15        56.    The decoding method according to claim  
53, wherein a low pass filter is used in said  
restraining.

20        57.    The decoding method according to claim  
54, wherein a low pass filter is used in said  
restraining.

25        58.    The decoding method according to claim  
55, wherein a low pass filter is used in said  
restraining.

59.    The decoding method according to claim



53, wherein in said restraining, at least a horizontal component or a vertical component is restrained.

5           60.    The decoding method according to claim 54, wherein in said restraining, at least a horizontal component or a vertical component is restrained.

10           61.    The decoding method according to claim 55, wherein in said restraining, at least a horizontal component or a vertical component is restrained.

15           62.    The decoding method according to claim 53, wherein an encoding method is a discrete wavelet transform method.

20           63.    The decoding method according to claim 54, wherein an encoding method is a discrete wavelet transform method.

25           64.    The decoding method according to claim 55, wherein an encoding method is a discrete wavelet transform method.

65.    The decoding method according to claim

53, wherein an encoding method conforms to  
JPEG2000.

66. The decoding method according to claim  
5 54, wherein an encoding method conforms to  
JPEG2000.

67. The decoding method according to claim  
55, wherein an encoding method conforms to  
10 JPEG2000.

68. A decoding apparatus for decoding  
encoded image data which has been hierarchically  
encoded in advance, comprising:

15 a determination unit that determines a layer  
of hierarchy up to which the encoded image data is  
to be decoded;

a decoder which decodes the encoded image  
data up to the determined layer;

20 a judging unit that judges whether or not  
the determined layer corresponds to the highest  
layer of hierarchy of the encoded image data; and

a restraining unit that restrains, when the  
determined hierarchy does not corresponds to the  
25 highest layer, a frequency component, which causes  
alias, of the decoded image data.

69. A decoding apparatus for decoding encoded image data which has been hierarchically encoded in advance, comprising:

a decoder that decodes all of the encoded  
5 image data;

a judging unit which judges whether or not the encoded image data was obtained as a result of encoding all layers of hierarchy; and

a restraining unit that restrains, when all  
10 the layers of hierarchy have not been encoded, a frequency component, which causes alias, of the decoded image data.

70. A decoding apparatus for decoding  
15 encoded image data which has been hierarchically encoded in advance, comprising:

an input unit that inputs encoded image data from external;

a determination unit that determines a layer  
20 of hierarchy up to which the encoded image data is to be decoded;

a decoder that decodes the encoded image data up to the determined layer;

a judging unit that judges whether or not  
25 all layers of hierarchy of the encoded image data have been decoded; and

a restraining unit that restrains, when all

the layers of hierarchy have not been decoded, a frequency component, which causes alias, of the decoded image data.

5           71.    The decoding apparatus according to claim 68, wherein said restraining unit uses a low pass filter.

          72.    The decoding apparatus according to  
10 claim 69, wherein said restraining unit uses a low pass filter.

          73.    The decoding apparatus according to claim 70, wherein said restraining unit uses a low  
15 pass filter.

          74.    The decoding apparatus according to claim 68, wherein said restraining unit restrains at least a horizontal component or a vertical  
20 component.

          75.    The decoding apparatus according to claim 69, wherein said restraining unit restrains at least a horizontal component or a vertical  
25 component.

          76.    The decoding apparatus according to

claim 70, wherein said restraining unit restrains at least a horizontal component or a vertical component.

5           77.     The decoding apparatus according to claim 68, wherein an encoding method is a discrete wavelet transform method.

          78.     The decoding apparatus according to  
10 claim 69, wherein an encoding method is a discrete wavelet transform method.

          79.     The decoding apparatus according to claim 70, wherein an encoding method is a discrete  
15 wavelet transform method.

          80.     The decoding apparatus according to claim 68, wherein an encoding method conforms to JPEG2000.

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          81.     The decoding apparatus according to claim 69, wherein an encoding method conforms to JPEG2000.

25           82.     The decoding apparatus according to claim 70, wherein an encoding method conforms to JPEG2000.

83. A storage medium, readable by an  
information processing apparatus, storing a  
program including program codes capable of  
5 realizing the decoding method according to claim  
53, the program being executable by the  
information processing apparatus.

84. A storage medium, readable by an  
10 information processing apparatus, storing a  
program including program codes capable of  
realizing the decoding method according to claim  
54, the program being executable by the  
information processing apparatus.

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85. A storage medium, readable by an  
information processing apparatus, storing a  
program including program codes capable of  
realizing the decoding method according to claim  
20 55, the program being executable by the  
information processing apparatus.